IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Michael S. Beck Kevin L. Conrad	Group Art Unit:	3661
		Examiner:	Unknown
Serial No.:	10/784,341		
		Atty. Docket:	2063.007400
Filed:	February 23, 2004		
For:	System And Method For Dynamically Controlling An Attitude Of An Articulated Vehicle	Client Docket:	VS-00647
		Confirmation:	2359

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby submit this Appeal Brief to the Board of Patent Appeals and Interferences in response to the non-final Office Action dated October 24, 2007. The fee for filing this Appeal Brief is $510, and is attached hereto.

The fee for filing this Appeal Brief is $510 and the Commissioner is authorized to deduct said fees from Williams, Morgan & Amerson Deposit Account No. 50-0786 (2063.007400).

I. REAL PARTY IN INTEREST

Lockheed Martin Corporation, the assignee hereof, is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences of which Applicants, Applicants' legal representative, or the Assignee are aware that will directly affect or be directly affected by or have a bearing on the decision in this appeal.

III. STATUS OF THE CLAIMS

Applicants appeal from all rejections in the Office Action dated October 24, 2007 (the "October 24th Office Action"). Claims 1-53 are pending in the case. The treatment of the claims in the "Office Action Summary" is inconsistent with their treatment in the "Detailed Action":

- In the "Office Action Summary", claims 1, 14, 20, 38, and 46 were listed as rejected, and claims 2-13, 15-19, 21-37, 39-45, and 47-53 were indicated as having been objected to. (October 24th Office Action, "Office Action Summary," ¶¶6-7)
- In the "Detailed Action", the Office rejected claims 1, 5, 14, 20, 38, and 46 as indefinite under 35 U.S.C. §112, ¶2. (October 24th Office Action, "Detailed Action," p. 2, ¶4; p. 3, ¶5) Claims 3-13, 15-19, 21-37, 39-35, and 47-53 were objected to "because of deficiencies from [*sic*] their rejected parent claims." (October 24th Office Action, "Detailed Action," p. 4, ¶6) Additionally, the Office stated that it maintained an earlier rejection of claims 1-2 under 35 U.S.C. §112, ¶2. (October 24th Office Action, "Detailed Action," p. 2, ¶3)

Since the "Office Action Summary" lacks sufficient specificity to support any *prima facie* rejections, Applicants presume the treatment of the claims in the "Detailed Action" is correct, and proceed accordingly in this appeal. For the convenience of the Office, Applicants therefore identify the claims in the appeal as claims 1-2, 5, 14, 20, 38, and 46.

The claims are also subject to their second restriction in the October 24th Office Action. The first restriction requirement was set forth in the Office Action dated May 4, 2007 (the "May 4th Office Action") and has neither been made final nor withdrawn. However, no claim has yet been withdrawn from consideration as of yet.

IV. STATUS OF AMENDMENTS

There were no amendments submitted after the "final" Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

FIG. 1A-FIG. 1C are a side elevational, an end elevational view, and a top plan view, respectively, of an illustrative embodiment of the vehicle 100 according to the present invention.

¶[0039] The vehicle 100 comprises a plurality of wheel assemblies 102 articulated with a chassis 104. ¶[0039] In the illustrated embodiment, each of the plurality of wheel assemblies 102 is rotationally articulated with the chassis 104, as indicated by arrows 103. ¶[0039] Other articulations, however, are possible, such as linear articulations. ¶[0039] The scope of the present invention relates to a vehicle utilizing any type of articulation, not just the rotational articulation of **FIG. 1A-FIG. 1C**. ¶[0039]

In the embodiment illustrated in **FIGS. 1A-1C**, the wheel assemblies 102, when attached to the chassis 104, implement an articulated suspension system for the vehicle 100. ¶[0040] Thus, by way of example and illustration, the articulated suspension system is but one articulable means for rolling the chassis 104 along a path in accordance with the present invention. ¶[0040] Each of the wheel assemblies 102 comprises a link structure or suspension arm, 112, a wheel 116 articulable with respect to the link structure 112, and a hub drive 114 for rotating the wheel 116. ¶[0041] The vehicle 100, as illustrated in **FIG. 1A-FIG. 1C**, includes six wheel assemblies 102. ¶[0041]

The vehicle 100, for example, may comprise the same number of wheel assemblies 102 articulated with a first side 106 and articulated with a second side 108 of the chassis 104, as shown in **FIG. 1A-FIG. 1C**. ¶[0042] However, the vehicle 100 may alternatively include a different number of wheel assemblies 102 articulated with the first side 106 than are articulated with the second side 108. ¶[0042] Thus, for example, the scope of the present invention encompasses a vehicle (*e.g.*, the vehicle 100) having three wheel assemblies 102 articulated with the first side 106 and four wheel assemblies 102 articulated with the second side 108. ¶[0042] Generally, a vehicle 100, such as the one shown in **FIG. 1A-FIG. 1C**, comprises ¶[¶[0043]: the chassis 104 ¶[0044]; a plurality of suspension arms 112 ¶[0045]; a shoulder joint for articulating each of the suspension arms 112 with the chassis 104 ¶[0046]; an active damper (*e.g.*, a magnetorheological ("MR") rotary damper) connecting each of the suspension arms 112 to the chassis 104; ¶[0048] a drive train for propelling the vehicle 100 ¶[0047]; and a power system for powering the drive train, control system, and other elements of the vehicle 100 ¶[0049].

FIG. 14 is a stylized block diagram of an illustrative embodiment of a system for controlling an attitude of an articulated vehicle according to the present invention. ¶[0029] As can be seen therein, the vehicle 100 includes a controller 1402 and a variety of sensors acquiring data from which the state of the vehicle can be ascertained. (*see* **FIG. 13**; ¶[0110]-¶[0118]) For

example, the wheel assemblies 102 include a load sensor 1404, the shoulder joints 110 each have an encoder 1418, the tires 410 have pressure sensors 1405, etc.

The illustrated embodiment executes various control methodologies in a predictive manner, taking into account the dynamic properties of the vehicle 100. ¶[0111] **FIG. 13** illustrates one particular embodiment of the predictive control model according to the present invention. ¶[0111] The predictive control model (represented by block 1302) comprises a real-time physics model of the vehicle 100 adapted to predict the motion of the vehicle 100 before the motion takes place. ¶[0111] The model 1302 uses as inputs at least one of many current vehicle properties (represented by block 1304), such as the vehicle's sprung and unsprung mass of the vehicle 100, other articulable mass of the vehicle 100 (*e.g.*, ¶[0111] the turret 1602, the sensor mast 1702, and the like), and the mission configuration of the vehicle 100, as well as the inertia, velocity, acceleration, and momentum of the vehicle 100. ¶[0111] The current vehicle attitude and location (represented by block 1306) and the desired vehicle attitude and location (represented by block 1308) are also inputs to the predictive control model 1302. ¶[0111]

In real time, the predictive control model 1302 calculates the control commands (represented by block 1310) required to move the vehicle 100 to the desired attitude and location. ¶[0112] The model calculates the CG and stability limits of the vehicle 100 in its current state and manipulates the wheel assemblies 102, active dampers (*e.g.*, the rotary MR dampers 402), and any other articulable mass associated with the vehicle 100 to affect the CG and stability limits of the vehicle 100 to reach the desired location and attitude without unfavorable impacts such as a roll-over. ¶[0112] In the same way a skier shifts weight to his downhill ski to improve stability, the predictive control model 1302 dynamically articulates the wheel assemblies 102 (and/or other articulable masses of the vehicle 100) to place the vehicle in a more stable configuration, taking into account the vehicle's dynamic properties, CG, and stability limits, to achieve the desired vehicle state. ¶[0113]

The vehicle 100, through the implementation of the predictive control model 1302 by the controller 1402, assess the state of the vehicle 100 and articulates the suspension system by rotating the wheel assemblies 102. In general, the vehicle's stability may be controlled by determining at least one dynamic property of the vehicle (*e.g.*, the inertia, acceleration, velocity, momentum, and the like) and manipulating the articulated suspension based on the at least one dynamic property to affect the stability of the vehicle. ¶[0097] As the vehicle 100, 1500 travels,

it will likely encounter various types of terrain. If the terrain is relatively smooth and flat, little stability control may be required. ¶[0098] If the terrain is rough and/or hilly, however, more complex control of the vehicle 100, 1500 may be required. ¶[0098]

Thus, two exemplary scenarios are presented in the application in **FIG. 11** and **FIG. 12**. **FIG. 11** is a flow chart of a first illustrative embodiment of a method of controlling stability of an articulated vehicle. ¶[0026] **FIG. 12** is a flow chart of a second illustrative embodiment of a method of controlling stability of an articulated vehicle. ¶[0027]

Turning now to **FIG. 11**, in this scenario, control is exercised based on the vehicle 100 traversing across a generally smooth terrain, such that the positions of the wheel assemblies 102 are not actively controlled with respect to the chassis 104. ¶[0102] The damping scenario is determined (block 1102) based upon one or more characteristics of the vehicle (*e.g.* ¶[0102], the mass of the sprung and unsprung components and inertia, momentum, velocity, acceleration, attitude, location, and the like) and/or the mission configuration of the vehicle. ¶[0102] The damping levels of the active dampers are adjusted based upon the damping scenario (block 1104). ¶[0103] The dynamic response of the vehicle 100 is sensed (block 1106) based upon at least one of various properties of the vehicle 100, such as mass, inertia, velocity, acceleration, attitude, and location. ¶[0103] The dynamic response data (of block 1106) is analyzed (block 1108) to determine if the control should be biased depending upon the relationship between the actual dynamic response and the desired dynamic response. ¶[0103]

In this scenario of **FIG. 12**, the wheel assemblies 102 are actively controlled to maintain a desired stability of the vehicle 100. ¶[0106] the loads on each of the wheel assemblies 102 are determined (block 1202). ¶[0106] A determination is made as to whether the forces are level, *i.e.*, whether the forces on each of the wheel assemblies 102 are substantially level, *i.e.*, substantially equal (block 1204). ¶[0107] If the forces are not level, one or more of the vehicle components (*e.g.*, the wheel assemblies 102, the turret 1602 of **FIG. 16**, the mast 1702 of **FIG. 17**, or the like) is articulated with respect to the chassis 104 to level the forces (block 1206). ¶[0107]

Once the forces are leveled, the damping scenario is determined (block 1208) based upon one or more characteristics of the vehicle (*e.g.*, the mass of the sprung and unsprung components, the inertia, the momentum, the velocity, the acceleration, the attitude, the location, and the like) and/or the mission configuration of the vehicle. ¶[0108] The damping levels of the

active dampers are adjusted based upon the damping scenario (block 1210). ¶[0108] The dynamic response of the vehicle 100 is sensed (block 1212) based upon at least one of various properties of the vehicle 100, such as mass, inertia, velocity, acceleration, attitude, and location. ¶[0108] The dynamic response data (of block 1212) is analyzed (block 1214) to determine if the control should be biased depending upon the relationship between the actual dynamic response and the desired dynamic response. ¶[0108]

Now, turning to the language of the claims themselves, **claims 1, 14, 20, 38 and 46 are independen**t claims. With respect to **claim 1**, a method of controlling stability of a vehicle (*e.g.*, 100, **FIG. 1**; ¶[0049]-¶[0043]; **FIG. 14**) having an articulated suspension (*e.g.*, 100, 102, 110, 112, **FIG. 1**; ¶[0039]-¶[0096]; **FIG. 14**), the invention comprises:

- determining (*e.g.*, 1202, **FIG. 12**; ¶[0102]) at least one dynamic property of the vehicle; and
- manipulating (*e.g.*, 1208-1210, **FIG. 12**; ¶[0106]-¶[0108]) the articulated suspension based on the at least one dynamic property to affect the stability of the vehicle.

With respect to **claim 14**, a method of controlling stability of a vehicle (*e.g.*, 100, **FIG. 1**; ¶[0049]-¶[0043]; **FIG. 14**) having an articulated suspension (*e.g.*, 100, 102, 110, 112, **FIG. 1**; ¶[0039]-¶[0096]; **FIG. 14**), the invention comprises:

- determining (*e.g.*, 1102, **FIG. 11**; ¶[0102]) a damping scenario; and
- adjusting damping levels (*e.g.*, ¶[0099]-¶[0103]) of a plurality of active dampers of the articulated suspension.

With respect to **claim 20**, a method of controlling stability of a vehicle (*e.g.*, 100, **FIG. 1**; ¶[0049]-¶[0043]; **FIG. 14**) having an articulated suspension (*e.g.*, 100, 102, 110, 112, **FIG. 1**; ¶[0039]-¶[0096]; **FIG. 14**), the invention comprises:

- determining (*e.g.*, 1202, **FIG. 12**; ¶[0106]-¶[0107]) a load on each of a plurality of wheel assemblies of the articulated suspension; and
- manipulating (*e.g.*, 1206-1210, **FIG. 12**; ¶[0107]-¶[0109]) at least one component of the vehicle to affect a center of gravity of the vehicle or the vehicle's stability limits.

With respect to **claim 38**, a system for controlling stability of a vehicle (*e.g.*, 100, **FIG. 1**; ¶[0049]-¶[0043]; **FIG. 14**) having an articulated suspension (*e.g.*, 100, 102, 110, 112, **FIG. 1**; ¶[0039]-¶[0096]; **FIG. 14**), the invention comprises:

- a plurality of sensors (*e.g.*, 1404, 1406, 1410, 1412, 1414, 1416-1418, **FIG. 14**) for sensing a state of the vehicle; and
- a controller (*e.g.*, 1402, **FIG. 14**) coupled with the plurality of sensors and adapted to articulate (*e.g.*, **FIG. 13**; ¶[0110]-¶[0118]) at least one component of the vehicle to affect the vehicle's center of gravity or the vehicle's stability limits.

With respect to **claim 46**, a vehicle (*e.g.*, 100, **FIG. 1**; ¶[0049]-¶[0043]; **FIG. 14**), the invention comprises:

- a chassis (*e.g.*, 104, **FIG. 1**; ¶[0044], ¶[0051]);
- at least one component (*e.g.*, 102, **FIG. 1**; ¶[0040]-¶[0041]) articulable with respect to the chassis;
- a plurality of sensors (*e.g.*, 1404, 1406, 1410, 1412, 1414, 1416-1418, **FIG. 14**) for sensing a state of the vehicle; and
- a controller (*e.g.*, 1402, **FIG. 14**) coupled with the plurality of sensors and adapted to articulate (*e.g.*, **FIG. 13**; ¶[0110]-¶[0118]) the at least one articulable component to affect the vehicle's center of gravity or the vehicle's stability limits.

Note that the references in parentheses are not limitations in the claims but relate the claim language to Applicant's disclosure in compliance with the Rules of Practice.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-2 are indefinite under 35 U.S.C. §112, ¶2 because they are "too broad" and pose a "serious burden" in examination.

B. Whether claims 1, 14, 20, 38, and 46 are indefinite under 35 U.S.C. §112, ¶2 because they lack statements of intended use in the preambles.

C. Whether claims 1, 5, 14, 38, and 46 are indefinite under 35 U.S.C. §112, ¶2 for recitation of various limitations in those claims.

VII. ARGUMENT

Each of the rejections is for indefiniteness under 35 U.S.C. §112, ¶2. However, not one of the rejections employed the proper legal test, and each of them has therefore failed to establish *prima facie* indefiniteness. Furthermore, when the proper analysis is applied, it is clear that the claims are all definite.

A. CLAIMS 1-2 ARE DEFINITE

The Office rejected claims 1-2 as indefinite under 35 U.S.C. §112, ¶2 because they are "too broad" and pose a "serious burden" in examination. More particularly, to quote the Office:

> The examiner maintains his rejections under 35 U.S.C. 112, second paragraph for claims1-2. A reason why claim 1 is very broad because the disclosure essentially point [*sic*] out this is an unmanned ground vehicle (see a disclose [*sic*] of priority paper [*sic*], U.S. Professional Application Ser. No. 60/449,271, entitled "Unmanned Ground Vehicle," filed Feb. 21, 2003); however, the applicants broadly claim a general vehicle making examiner's interpreting [*sic*] claimed limitations very obvious [*sic*], accordingly. The examiner confirms that <u>because the pending claims are too broad</u>, <u>a serious burden clearly present</u> to the examiner from current state of the art in the vehicle field.

(October 24th Office Action, "Detailed Action", p. 2, ¶3) Earlier in the prosecution, the Office indicated that the phrase "dynamic property" was too broad for the claims to be considered definite. (May 5th Office Action, "Detailed Action", p. 2, ¶3a)

A claim's definiteness is not contingent on the breadth of its scope. The rejection is improper on its face and directly violates Office policy:

> 2173.04 Breadth Is Not Indefiniteness
>
> ***Breadth of a claim is not to be equated with indefiniteness.*** *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph.
>
> Undue breadth of the claim may be addressed under different statutory provisions, depending on the reasons for concluding that the claim is too broad. If the claim is too broad because it does not set forth that which applicants regard as their invention as

> evidenced by statements outside of the application as filed, a rejection under 35 U.S.C. 112, second paragraph, would be appropriate. If the claim is too broad because it is not supported by the original description or by an enabling disclosure, a rejection under 35 U.S.C. 112, first paragraph, would be appropriate. If the claim is too broad because it reads on the prior art, a rejection under either 35 U.S.C. 102 or 103 would be appropriate.

M.P.E.P. §2173.04 (emphasis added).

Whether the Office thinks the language is broad is irrelevant. The test is "…whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent." M.P.E.P. §§2173, 2173.02. Note also that whether the claim presents a "serious burden" in examination appears nowhere in this statement. This consideration is irrelevant in the determination of whether the claim is definite.

Office policy sets out a context in which this determination of whether a claim is infdefinite is made:

> The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:
>
> (A) The content of the particular application disclosure;
>
> (B) The teachings of the prior art; and
>
> (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

M.P.E.P. §2173.04. The Office has not cited a single one of these factors in the rejection. Note again that not one of these factors touches on the breadth of the claim or on the burden during examination. The Office has therefore arbitrarily and capriciously decided that the language is too broad for its liking.

If one disregards the erroneous analysis proffered by the Office and applies the correct analysis set forth in M.P.E.P. §§2173, 2173.02 in light of the context defined in M.P.E.P. §2173.04, the claims are definite. So, too, are all the claims that depend from those claims. The breadth of the claims and the burden in examination on which the Office relies are irrelevant to

the determination. Accordingly, the Office has failed to establish *prima facie* that claims 1-2 are indefinite because of their breadth.

B. CLAIMS 1, 14, 20, 38, AND 46 ARE DEFINITE DESPITE THEIR PREAMBLES

The Office rejected claims 1, 14, 20, 38, and 46 are indefinite under 35 U.S.C. §112, ¶2 because they lack statements of intended use in the preambles. More particularly, the Office stated:

> According to the very vague introduction in claim 46, and insufficient information in preamble portions of claims 1, 14, 20, and 38, the examiner considers there is no sufficient preamble in these claims…

(October 24th Office Action, "Detailed Action", p. 3, ¶4) This is the wrong analysis.

The test is "…whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent." M.P.E.P. §§2173, 2173.02. The context defined by the Office in which the test is to be applied nowhere contemplates any affect of the presence or absence of a statement of intended use in the preamble. *See* M.P.E.P. §2173.04. Office policy on the effect of the preamble on a claim in M.P.E.P. §2111.02, and nowhere is there any hint or suggestion—much less any express statement—that preamble of claim has any effect on the claim's definiteness. Whether the preamble contains a statement of use is irrelevant to the question of whether the claim is definite.

The Office miscites several cases in support of its position. Each of these cases is inapposite to the present point. The Office cited *In re Casey*, 152 U.S.P.Q. (BNA) 235 (CCPA 1967); *Kropa v. Robie*, 88 U.S.P.Q. (BNA) 478 (CCPA 1951); *Ex parte Mott*, 190 U.S.P.Q. (BNA) 311 (PTO Bd. App. 1975). However, none of these cases stand for the proposition that a claim whose preamble omits a statement of intended use is invalid. These cases instead concern whether a preamble's statement of intended use limits the scope of a claim as a whole.

Accordingly, the Office has cited no legitimate authority for the proposition that failure to recite a statement of intended use in the preamble renders a claim indefinite. This is in part because there is no such authority because that is not a correct statement of the law. There is no requirement that a claim state an intended use in its preamble. Claims 1, 14, 20, 38, and 46 are

definite under 35 U.S.C. §112, ¶2 despite the absence of a statement of intended use because those skilled in the art can ascertain the scope of the inventions claimed therein. So, too, are all the claims that depend from those claims. At a minimum, the Office has failed to properly establish to the contrary.

C. THE LIMITATIONS OF CLAIMS 1, 5, 14, 38, AND 46 ARE DEFINITE

Claims 1, 5, 14, 38, and 46 are indefinite under 35 U.S.C. §112, ¶2 for recitation of various limitations in those claims. However, each claim is rejected for a separate allegedly indefinite limitation. Construed correctly and examined under the correct legal test, all limitations are definite.

1. CLAIM 1- "DYNAMIC PROPERTY" IS DEFINITE

Claim 1 is recited because the limitation "dynamic property" is "broad". (October 24th Office Action, "Detailed Action", p. 3, ¶5a) Whether the Office thinks the language is broad is irrelevant. The test is "…whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent." M.P.E.P. §§2173, 2173.02. Office policy sets out a context in which this determination is made:

> The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:
>
> (A) The content of the particular application disclosure;
>
> (B) The teachings of the prior art; and
>
> (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

M.P.E.P. § 2173.04. Once again, the Office has not cited a single one of these factors in the rejection. The Office has therefore arbitrarily and capriciously decided that the language is too broad for its liking and is now requiring—without justification—that Applicants provide a definition.

If the proper analysis is employed, it the language is manifestly clear. The notion of "dynamic property" has an intuitive meaning of a property associated with the motion of the vehicle. The specification sharpens this intuitive meaning:

> In unmanned ground vehicles (*e.g.*, the vehicle 100 of **FIGS. 1A-1C** and the vehicle 1500 of FIGS. 15A-15B), as well as in other vehicles, it is often desirable to control the vehicle's stability so that a proper course may be held while traversing along a path, discrete obstacles may be overcome, and/or anomalies, such as roll-over, may be prevented. In one embodiment, the vehicle's stability may be controlled by determining at least one dynamic property of the vehicle (*e.g.*, the inertia, acceleration, velocity, momentum, and the like) and manipulating the articulated suspension based on the at least one dynamic property to affect the stability of the vehicle.

¶[0097] Thus, a "dynamic property" is one affecting the vehicle's stability in motion. To further sharpen the meaning, the specification actually gives examples of what a dynamic property might be—namely, "the inertia, acceleration, velocity, momentum, and the like". Furthermore, the structure of the claims reinforces the clarity of the term when claim 2 more particularly limits the "dynamic property" of claim 1 to one of the examples given in the specification.

Furthermore, a claim or limitation is not indefinite solely because it is broad. This is improper and directly violates Office policy:

> 2173.04 Breadth Is Not Indefiniteness
>
> ***Breadth of a claim is not to be equated with indefiniteness.*** *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph.
>
> Undue breadth of the claim may be addressed under different statutory provisions, depending on the reasons for concluding that the claim is too broad. If the claim is too broad because it does not set forth that which applicants regard as their invention as evidenced by statements outside of the application as filed, a rejection under 35 U.S.C. 112, second paragraph, would be appropriate. If the claim is too broad because it is not supported by the original description or by an enabling disclosure, a rejection under 35 U.S.C. 112, first paragraph, would be appropriate. If the

> claim is too broad because it reads on the prior art, a rejection under either 35 U.S.C. 102 or 103 would be appropriate.

M.P.E.P. § 2173.04 (emphasis added).

The Office, on the other hand, cites no evidence and gives no reasoning to support its position that the limitation "dynamic property" is too broad. Aside from the fact this directly contravenes Office policy as a ground for rejection, the proper analysis set out in the M.P.E.P. reveals that the language is, in fact, definite. One skilled in the art can ascertain its meaning and, hence, the bounds of the claim, as well as those that depend from it.

2. CLAIM 5—THERE IS AN ANTECEDENT BASIS

The Office failed to state the ground for rejecting claim 5 in the October 24th Office Action. In the previous Office Action, the May 4th Office Action, the Office rejected claim 5 as lacking antecedent basis for the limitation "the at least one of the attitude." The antecedent is clearly recited earlier in the claim. Claim 5, as previously amended, is reproduced below with the subject limitation and its antecedent emphasized:

> 5. A method, according to claim 1, further comprising determining ***an attitude or a location*** of the vehicle, such that manipulating the articulated suspension comprises manipulating the articulated suspension based upon ***the attitude or the location*** of the vehicle.

Accordingly, Applicants request that the rejection be withdrawn.

3. CLAIMS 38, 46—THE STATE OF THE VEHICLE IS DEFINITE

Claims 38, 46 were rejected as "unclear" for the limitation "a state of the vehicle", and the Office requested a definition. (October 24th Office Action, "Detailed Action", p. 3, ¶5b) The question "…whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent." M.P.E.P. §§2173, 2173.02. As noted above, according to Office policy:

> The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a

> reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:
>
> (A) The content of the particular application disclosure;
>
> (B) The teachings of the prior art; and
>
> (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

M.P.E.P. § 2173.04. Again, the Office has not cited a single one of these factors in the rejection.

Applicant respectfully submits that any given object, including any vehicle, has a "state" in which it exists. This is a fundamental fact of existence. Accordingly, those of ordinary skill in the art will be aware of this fact. The question then becomes if they will understand the reference to the vehicle's state used in the claims. To assist those skilled in the art, the specification directly addresses this concept:

> In real time, the predictive control model 1302 calculates the control commands (represented by block 1310) required to move the vehicle 100 to the desired attitude and location. The model calculates the CG and stability limits of ***the vehicle 100 in its current state*** and manipulates the wheel assemblies 102, active dampers (*e.g.*, the rotary MR dampers 402), and any other articulable mass associated with the vehicle 100 to affect the CG and stability limits of the vehicle 100 to reach the desired location and attitude without unfavorable impacts such as a roll-over.
>
> In the same way a skier shifts weight to his downhill ski to improve stability, the predictive control model 1302 dynamically articulates the wheel assemblies 102 (and/or other articulable masses of the vehicle 100) to place the vehicle in a more stable configuration, taking into account the vehicle's dynamic properties, CG, and stability limits, ***to achieve the desired vehicle state***.

¶[0112]-¶[0113] (emphasis added)

Applicants respectfully submit that one of ordinary skill in the art would therefore have no difficulty understanding what is meant by the "state of the vehicle" when the proper analysis is employed. A vehicle inherently exists in a "state", and the specification demonstrates how that term is used in the present context. On the other hand, the Office has yet to cite one fact or argument supporting its position. Thus, claims 38 and 46, and any claims depending therefrom, are definite.

4. CLAIM 14-"DAMPING SCENARIO" IS DEFINITE

The Office rejected claim 14 as indefinite because "…the examiner fails to see <u>how to 'determine a damping scenario'</u>"…. (October 24th Office Action, "Detailed Action", p. 4, ¶5c) Once again, whether the examiner can see how to do this is irrelevant. The test is whether those skilled in the art can determine the scope of the invention. M.P.E.P. §§2173, 2173.02. The Office has accordingly once again used the wrong analysis. *See* M.P.E.P. § 2173.04.

However, Applicants respectfully submit that sufficient disclosure has been provided that those skilled in the art will readily be able to ascertain how to "determine a damping scenario". Applicants provide a great deal of information about how the articulation of the suspension system can be dampened as a part of the articulation. (¶[0064]- ¶[0078]) Applicants also provide a great deal of information as to how the suspension may be articulated as the vehicle crosses both smooth and rough terrain. (¶[0097]- ¶[0113]) Since damping is a part of articulation and both damping and articulation have been thoroughly disclosed, those of ordinary skill in the art will certainly be able to tell what it means to "determine a damping scenario". Indeed, two specific examples are actually provided in **FIG. 11** and **FIG. 12** and are discussed in ¶[0097]- ¶[0113].

Claim 14, as well as any claim dependent therefrom, is accordingly definite. Those of ordinary skill in the art will be able to ascertain its scope, particularly when viewed in light of Applicants' disclosure. The Office has employed a legally incorrect analysis without regard to a single factor of the correct test. Accordingly, the Office has, at a minimum, failed to establish *prima facie* that claim 14 is indefinite.

D. CONCLUSION-ALL CLAIMS ARE DEFINITE

Applicants therefore submit that all claims are definite. The Office has employed the incorrect legal standard and the incorrect legal analysis in every one of the rejections. Thus, it has failed to establish *prima facie* indefiniteness for even a single claim. And if one actually employs the correct legal analysis under the correct legal standard, it is clear that all the claims are indeed definite. Breadth is not indefiniteness, and claims are not required to state an intended use in the preambles. The antecedent bases are present. And the disclosure is sufficiently detailed so that those of ordinary skill in the art can readily ascertain the scope of any limitation in the claims. Wherefore, Applicants pray that all rejections be reversed.

VIII. CLAIMS APPENDIX

The claims that are the subject of the present appeal are set forth in the attached "Claims Appendix." The claims that are not subject to this appeal are also set forth for the convenience of the Board.

IX. EVIDENCE APPENDIX

There is no separate Evidence Appendix for this appeal.

X. RELATING PROCEEDINGS APPENDIX

There is no Related Proceedings Appendix for this appeal.

XI. CONCLUSION

Applicant respectfully submits that the application is in condition for allowance. Accordingly, Applicant requests that the rejections be overturned and that the application be allowed to issue.

The Examiner is invited to contact the undersigned attorneyat (713) 934-4053 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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Claims Appendix

(Claims in Issue)

1. A method of controlling stability of a vehicle having an articulated suspension, comprising:

   determining at least one dynamic property of the vehicle; and

   manipulating the articulated suspension based on the at least one dynamic property to affect the stability of the vehicle.

2. A method, according to claim 1, wherein determining the at least one dynamic property comprises determining at least one of the inertia, velocity, acceleration, or and momentum of the vehicle.

3. A method, according to claim 1, wherein manipulating the articulated suspension comprises manipulating the articulated suspension to affect a center of gravity of the vehicle.

4. A method, according to claim 1, wherein manipulating the articulated suspension comprises manipulating the articulated suspension to affect stability limits of the vehicle.

5. A method, according to claim 1, further comprising determining an attitude or a location of the vehicle, such that manipulating the articulated suspension comprises manipulating the articulated suspension based upon the attitude or the location of the vehicle.

6. A method, according to claim 1, further comprising determining a sprung mass and an unsprung mass of the vehicle, such that manipulating the articulated suspension comprises manipulating the articulated suspension based upon the sprung and the unsprung mass.

7. A method, according to claim 1, further comprising using a predictive model to determine how the articulated suspension is to be manipulated.

8. A method, according to claim 7, wherein using the predictive model comprises using a real-time physics model of the vehicle to determine how the articulated suspension is to be manipulated.

9. A method, according to claim 1, wherein manipulating the articulated suspension comprises articulating at least one of a plurality of wheel assemblies of the articulated suspension with respect to a chassis of the vehicle.

10. A method, according to claim 1, wherein manipulating the articulated suspension comprises actively damping the articulated suspension.

11. A method, according to claim 1, further comprising articulating a turret or and a mast of the vehicle with respect to a chassis of the vehicle.

12. A method, according to claim 11, wherein articulating the turret or the mast comprises articulating the turret or the mast to substantially level loads on wheel assemblies of the articulated suspension.

13. A method, according to claim 1, wherein manipulating the articulated suspension comprises articulating at least one of a plurality of wheel assemblies with respect to a chassis of the vehicle to substantially level loads on the plurality of wheel assemblies.

14. A method of controlling stability of a vehicle having an articulated suspension, comprising:

determining a damping scenario; and

adjusting damping levels of a plurality of active dampers of the articulated suspension.

15. A method, according to claim 14, wherein determining the damping scenario comprises determining the damping scenario based upon the vehicle's mass, inertia, velocity, acceleration, attitude, position, or mission configuration.

16. A method, according to claim 14, wherein determining the damping scenario comprises determining the damping scenario based upon the terrain over which the vehicle is to travel.

17. A method, according to claim 14, further comprising sensing a dynamic response of the vehicle and analyzing the sensed dynamic response for biasing the determination of the damping scenario.

18. A method, according to claim 17, wherein sensing the dynamic response comprises sensing the vehicle's inertia, velocity, acceleration, attitude, or position.

19. A method, according to claim 17, wherein determining the damping scenario and adjusting the damping levels are carried out based upon a predictive model.

20. A method of controlling stability of a vehicle having an articulated suspension, comprising:

determining a load on each of a plurality of wheel assemblies of the articulated suspension; and

manipulating at least one component of the vehicle to affect a center of gravity of the vehicle or the vehicle's stability limits.

21. A method, according to claim 20, wherein determining the load comprises sensing a load on each suspension arm of the plurality of wheel assemblies.

22. A method, according to claim 20, wherein determining the load comprises sensing a pressure of each tire of the plurality of wheel assemblies.

23. A method, according to claim 20, wherein manipulating the at least one component comprises articulating the articulated suspension.

24. A method, according to claim 23, wherein articulating the articulated suspension comprises articulating the articulated suspension to substantially equalize the forces.

25. A method, according to claim 23, wherein articulating the articulated suspension comprises articulating at least one of the plurality of wheel assemblies with respect to a chassis of the vehicle.

26. A method, according to claim 20, wherein manipulating the component comprises articulating a turret or a mast of the vehicle with respect to a chassis of the vehicle.

27. A method, according to claim 20, wherein manipulating the component comprises manipulating the component based upon the vehicle's mass, inertia, velocity, acceleration, attitude, position, or mission configuration.

28. A method, according to claim 20, wherein manipulating the at least one component comprises manipulating the at least one component based upon the terrain over which the vehicle is to travel.

29. A method, according to claim 20, further comprising sensing a dynamic response of the vehicle and analyzing the sensed dynamic response for biasing the manipulation of the at least one component.

30. A method, according to claim 29, wherein sensing the dynamic response comprises sensing the vehicle's inertia, velocity, acceleration, attitude, or position.

31. A method, according to claim 20, further comprising:

determining a damping scenario; and

adjusting damping levels of a plurality of active dampers of the articulated suspension.

32. A method, according to claim 31, wherein determining the damping scenario comprises determining the damping scenario based upon the vehicle's mass, inertia, velocity, acceleration, attitude, position, or mission configuration.

33. A method, according to claim 31, wherein determining the damping scenario comprises determining the damping scenario based upon the terrain over which the vehicle is to travel.

34. A method, according to claim 31, further comprising sensing a dynamic response of the vehicle and analyzing the sensed dynamic response for biasing the determination of the damping scenario.

35. A method, according to claim 31, wherein sensing the dynamic response comprises sensing the vehicle's inertia, velocity, acceleration, attitude, or position.

36. A method, according to claim 31, wherein determining the damping scenario and adjusting the damping levels are carried out based upon a predictive model.

37. A method, according to claim 20, wherein determining the load and manipulating the at least one component are carried out based upon a predictive model.

38. A system for controlling stability of a vehicle having an articulated suspension, comprising:

a plurality of sensors for sensing a state of the vehicle; and

a controller coupled with the plurality of sensors and adapted to articulate at least one component of the vehicle to affect the vehicle's center of gravity or the vehicle's stability limits.

39. A system, according to claim 38, wherein the controller comprises a predictive, feed-forward controller.

40. A system, according to claim 38, wherein the articulated suspension comprises a plurality of wheel assemblies and the plurality of sensors comprises a plurality of load sensors for sensing loads on the plurality of wheel assemblies.

41. A system, according to claim 38, wherein the articulated suspension comprises a plurality of wheel assemblies each having a tire and the plurality of sensors comprises a plurality of pressure sensors for sensing pressure within the tires.

42. A system, according to claim 38, wherein the plurality of sensors comprises an inertia sensor, a velocity sensor, an acceleration sensor, an attitude sensor, a location sensor, an odometer, a global positioning unit receiver, an inertial measurement unit, or an inclinometer.

43. A system, according to claim 38, wherein the controller employs a real-time physics model for determining how to articulate the at least one component of the vehicle.

44. A system, according to claim 38, wherein the vehicle comprises a chassis and the articulated suspension comprises a plurality of wheel assemblies articulable with respect to the

chassis, such that the controller is adapted to articulate the plurality of wheel assemblies to affect the center of gravity or the stability limits of the vehicle.

45. A system, according to claim 38, wherein the vehicle comprises a chassis and a turret or a mast, and the controller is adapted to articulate the turret or the mast to affect the center of gravity or the stability limits of the vehicle.

46. A vehicle, comprising:

a chassis;

at least one component articulable with respect to the chassis;

a plurality of sensors for sensing a state of the vehicle; and

a controller coupled with the plurality of sensors and adapted to articulate the at least one articulable component to affect the vehicle's center of gravity or the vehicle's stability limits.

47. A vehicle, according to claim 46, wherein the controller comprises a predictive, feed-forward controller.

48. A vehicle, according to claim 46, wherein the articulated suspension comprises a plurality of wheel assemblies and the plurality of sensors comprises a plurality of load sensors for sensing loads on the plurality of wheel assemblies.

49. A vehicle, according to claim 46, wherein the articulated suspension comprises a plurality of wheel assemblies each having a tire and the plurality of sensors comprises a plurality of pressure sensors for sensing pressure within the tires.

50. A vehicle, according to claim 46, wherein the plurality of sensors comprises an inertia sensor, a velocity sensor, an acceleration sensor, an attitude sensor, a location sensor, an

odometer, a global positioning unit receiver, an inertial measurement unit, or ~~and~~ an inclinometer.

51. A vehicle, according to claim 46, wherein the controller employs a real-time physics model for determining how to articulate the at least one articulable component.

52. A vehicle, according to claim 46, wherein the articulated suspension comprises a plurality of wheel assemblies articulable with respect to the chassis and the controller is adapted to articulate the plurality of wheel assemblies to affect the center of gravity or the stability limits of the vehicle.

53. A vehicle, according to claim 46, wherein the vehicle comprises a turret or a mast and the controller is adapted to articulate the turret or the mast to affect the center of gravity or ~~and~~ the stability limits of the vehicle.